

Observed properties of Giant Cells

David H. Hathaway, NASA/Marshall

Lisa Upton, Vanderbilt University and The University of Alabama, Huntsville

Owen Colegrove, University of Rochester

The existence of Giant Cells has been suggested by both theory and observation for over 45 years. We have tracked the motions of supergranules in SDO/HMI Doppler velocity data and find larger (Giant Cell) flows that persist for months. The flows in these cells are clockwise around centers of divergence in the north and counter-clockwise in the south. Equatorward flows are correlated with prograde flows - giving the transport of angular momentum toward the equator that is needed to maintain the Sun's rapid equatorial rotation. The cells are most pronounced at mid- and high-latitudes where they exhibit the rotation rates representative of those latitudes. These are clearly large, long-lived, cellular features, with the dynamical characteristics expected from the effects of the Sun's rotation, but the shapes of the cells are not well represented in numerical models. While the Giant Cell flow velocities are small (<10 m/s), their long lifetimes should nonetheless substantially impact the transport of magnetic flux in the Sun's near surface layers.